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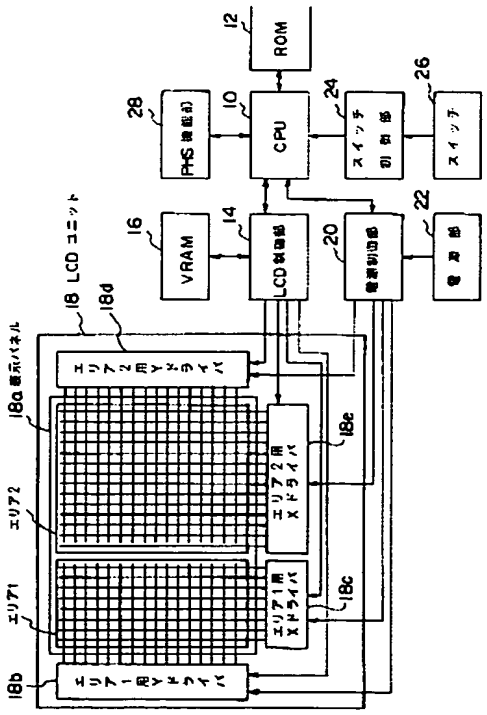
最終頁に続く

(54)【発明の名称】　情報機器

(57)【要約】
【課題】表示すべき情報量に応じて表示制御することで低消費電力化を図ることを可能にする。
【解決手段】複数の表示エリア１，２が設けられ、各表示エリア１，２を個別に表示駆動するＬＣＤユニット１８と、ＬＣＤユニット１８の各表示エリア１，２に対する表示駆動を制御するＬＣＤ制御部１４と、ＬＣＤユニット１８の各表示エリア１，２に対する表示駆動のための電力を、各表示エリア毎に供給する電源制御部２０と、ＬＣＤ制御部１４及び電源制御部２０を、ＬＣＤユニット１８の特定の表示エリアの表示が停止されるように制御するＣＰＵ１０とを具備し、特定の表示エリアの表示を停止することで低消費電力化を図る。



【特許請求の範囲】
【請求項１】　複数の表示エリアが設けられ、各表示エリアを個別に表示駆動する表示ユニットと、
前記表示ユニットの各表示エリアに対する表示駆動を制御する表示制御手段と、
前記表示ユニットの各表示エリアに対する表示駆動のための電力を、各表示エリア毎に供給する電源制御手段と、
前記表示制御手段及び前記電源制御手段を、前記表示ユニットの特定の表示エリアの表示が停止されるように制御する制御手段とを具備し、
特定の表示エリアの表示を停止することで低消費電力化を図ることを特徴とする情報機器。
【請求項２】　前記表示ユニットの特定の表示エリアの表示が不要であることを通知するための切り替え指示手段を具備し、
前記制御手段は、前記切り替え指示手段からの通知に応じて、前記表示制御手段及び前記電源制御手段を制御することを特徴とする請求項１記載の情報機器。
【請求項３】　前記表示ユニットの表示エリアの面上を覆う閉状態から開放する開状態まで回動自在となるように設けられたカバーを具備し、
前記制御手段は、前記カバーの開閉状態に応じて、前記表示制御手段及び前記電源制御手段を制御することを特徴とする請求項１記載の情報機器。
【請求項４】　電力を供給するための電源手段を具備し、
前記電源制御手段は、前記電源手段から供給可能な電力を検出する残量検出機能を有し、
前記制御手段は、前記電源制御手段の前記残量検出機能による検出結果に応じて、前記表示制御手段及び前記電源制御手段を制御することを特徴とする請求項１記載の情報機器。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、ＬＣＤ（液晶ディスプレイ）等の表示装置を有する情報機器に関する。
【０００２】
【従来の技術】一般に携帯型の情報機器においては、表示装置としてＬＣＤ（液晶ディスプレイ）が設けられたものが多い。通常、表示装置における情報表示方法は、１つのシステムに対し１つのＬＣＤを装備し、電源オン時にはＬＣＤ表示画面に情報を表示している。従来のドットマトリクス方式のＬＣＤでは、１つのＬＣＤユニットに対してＸ軸方向、Ｙ軸方向でそれぞれ表示用電極を駆動するための１系統のドライバが設けられている。電源オン時には各軸方向用のドライバに対して電力が供給され、ＬＣＤ表示画面全体が表示駆動の対象となる。
【０００３】ところで、携帯型の情報機器では、電池駆動により長時間使用できることが要求される。このため、表示装置における表示は、必要最低限に抑えて消費電力を低減させることが好ましい。
【０００４】しかし、携帯型の情報機器に設けられた機能によっては、常時、ある情報を提示しておく必要があり、この場合、情報をＬＣＤ表示画面において表示させようとすると、常に表示画面全体を表示駆動しなければならなくなる。例えば、情報機器に電池残量を通知する機能を設けた場合、常時、電池残量を示す情報を提示しておく必要があるため、この情報をＬＣＤ表示画面において表示させようとすると、ＬＣＤ画面を常時、表示駆動することになる。
【０００５】
【発明が解決しようとする課題】このように従来の情報機器においては、ＬＣＤ表示画面において何等かの情報を常時表示するためには、ＬＣＤ表示画面全体を常時、表示駆動しなければならなかった。このため、多くの電力を消費することになり、電池駆動により駆動可能な時間が短くなってしまう。
【０００６】本発明は前記のような事情を考慮してなされたもので、表示すべき情報量に応じて表示制御することで低消費電力化を図ることが可能な情報機器を提供することを目的とする。
【０００７】
【課題を解決するための手段】本発明は、複数の表示エリアが設けられ、各表示エリアを個別に表示駆動する表示ユニットと、前記表示ユニットの各表示エリアに対する表示駆動を制御する表示制御手段と、前記表示ユニットの各表示エリアに対する表示駆動のための電力を、各表示エリア毎に供給する電源制御手段と、前記表示制御手段及び前記電源制御手段を、前記表示ユニットの特定の表示エリアの表示が停止されるように制御する制御手段とを具備し、特定の表示エリアの表示を停止することで低消費電力化を図ることを特徴とする。
【０００８】また、前記表示ユニットの特定の表示エリアの表示が不要であることを通知するための切り替え指示手段を具備し、前記制御手段は、前記切り替え指示手段からの通知に応じて、前記表示制御手段及び前記電源制御手段を制御することを特徴とする。
【０００９】また、前記表示ユニットの表示エリアの面上を覆う閉状態から開放する開状態まで回動自在となるように設けられたカバーを具備し、前記制御手段は、前記カバーの開閉状態に応じて、前記表示制御手段及び前記電源制御手段を制御することを特徴とする。
【００１０】また、電力を供給するための電源手段を具備し、前記電源制御手段は、前記電源手段から供給可能な電力を検出する残量検出機能を有し、前記制御手段は、前記電源制御手段の前記残量検出機能による検出結果に応じて、前記表示制御手段及び前記電源制御手段を制御することを特徴とする。
【００１１】このような構成によれば、複数の表示エリ

アを個別に駆動できるようにすることで、表示すべき情報量に応じて、選択的に特定の表示エリアにおける表示を停止させることができる。従って、表示駆動する表示エリアが少なくなることで、その分、消費電力が低減される。

【００１２】また、切り替え指示手段（スイッチ）を設けることで、特定の表示エリアに対する表示駆動の停止を明示的に指示することができ、消費電力の低減を意図的に行なうことができる。

【００１３】また、表示エリアを覆うカバーの開閉状態に応じて、すなわちカバーで表示エリアの面上を覆うことで、対応する表示エリアにおける表示が不要であることが通知される場合には、連動して特定の表示エリアの表示駆動を停止させる表示制御を行なうことで、特定の表示エリアの表示を停止させるための明示的な操作が不要となる。

【００１４】また、情報機器を動作させるための電力を供給する電源手段（電池）に電池残量が少なくなった場合には、特定の表示エリアでの表示を停止させ、低電力消費化を図ることで、ある程度の表示、及び機能の実行可能な時間を延長させることができる。

【００１５】

【発明の実施の形態】以下、図面を参照して本発明の実施の形態について説明する。図１は本実施形態に係わる情報機器の構成を示すブロック図である。図１に示すように、本実施形態の情報機器は、ＣＰＵ１０、ＲＯＭ１２、ＬＣＤ制御部１４、ＶＲＡＭ１６、ＬＣＤユニット１８、電源制御部２０、電源部２２、スイッチ制御部２４、スイッチ２６、及びＰＨＳ（personal handy phone system）機能部２８が設けられている。

【００１６】ＣＰＵ１０は、情報機器全体の制御を司るもので、ＲＯＭ１２に格納されたプログラムに従う処理を実行する。ＲＯＭ１２は、ＣＰＵ１０の動作を規定するプログラムの他、各種データ等を格納するためのものである。ＲＯＭ１２に格納されるプログラムには、スイッチ制御部２４から通知されるスイッチ２６の状態に応じたＬＣＤ制御部１４及び電源制御部２０に対する制御（ＳＷプログラム）や、ＰＨＳ機能部２８を用いたデータ通信等の制御のためのプログラムが含まれている。

【００１７】ＬＣＤ制御部１４は、ＣＰＵ１０の制御のもとで、ＬＣＤユニット１８における情報表示の制御を行なう。ＬＣＤ制御部１４は、ＬＣＤユニット１８のドライバ（後述する）を、ＶＲＡＭ１６に格納された表示データに応じて駆動して情報を表示させる。また、ＬＣＤ制御部１４は、ＣＰＵ１０からの通知に応じて選択的にドライバを駆動させて（オン、オフ）、表示画面の特定のエリアについてのみ情報を表示させることができる。

【００１８】ＶＲＡＭ１６は、ＬＣＤユニット１８に表示すべき表示データを格納するもので、ＬＣＤ制御部１４によって制御される。ＬＣＤユニット１８は、電源制御部２０の制御により電力供給を受けて、ＬＣＤ制御部１４の制御のもとで情報表示を行なうもので、表示パネル１８ａ、エリア１用Ｙドライバ１８ｂ、エリア１用Ｘドライバ１８ｃ、エリア２用Ｙドライバ１８ｄ、及びエリア２用Ｘドライバ１８ｅが設けられている。表示パネル１８ａは、表示エリアがエリア１，２の２つに分割されており、それぞれに対応して設けられたドライバによって独立して表示駆動される。エリア１は、エリア１用Ｙドライバ１８ｂ及びエリア１用Ｘドライバ１８ｃによって表示駆動され、エリア２は、エリア２用Ｙドライバ１８ｄ及びエリア２用Ｘドライバ１８ｅによって表示駆動される。

【００１９】電源制御部２０は、ＬＣＤユニット１８を含む情報機器を構成する各部に対して、電源部２２からの電力を供給するものである。電源制御部２０は、電源部２２に蓄積されている電力量（電池残量）を監視する電池残量検出機能を有し、予め設定された所定の電圧値に電圧が低下した場合にＣＰＵ１０に通知すると共に、ＬＣＤユニット１８の所定のドライバに対する電力供給を制御する。

【００２０】電源部２２は、ＬＣＤユニット１８を含む情報機器を構成する各部に対して供給すべき電力を蓄積する電池である。スイッチ制御部２４は、スイッチ２６の状態（オン、オフ）を監視するもので、スイッチ２６が切替えられた際、すなわち表示パネル１８ａのエリア２に対する表示が不要である場合に、その旨をＣＰＵ１０に通知する。

【００２１】スイッチ２６は、表示パネル１８ａのエリア２の表示が不要である状態を検出するためのもので、本実施形態では表示画面のエリア２を覆うＬＣＤカバー３２が閉じられた際に切り替えられるものである。スイッチ２６の状態は、スイッチ制御部２４によって監視されており、ＣＰＵ１０に通知される。

【００２２】ＰＨＳ機能部２８は、パーソナルハンディホンシステム（ＰＨＳ）の規格に基づいて、無線通信を行なう機能である。ＰＨＳ機能部２８は、無線通信を介して送受されるデータや、基地局との間の電界強度をＣＰＵ１０に通知する。

【００２３】次に、本実施形態における動作について説明する。本実施形態における情報機器では、ＰＨＳ機能部２８により無線通信を行なう基地局との間の電界強度を表示するための機能、及び電源部２２に蓄積された電池残量を表示するための機能が設けられている。

【００２４】電界強度表示と電池残量表示は、例えば図２に示すようにＬＣＤユニット１８の表示パネル１８ａに設けられたエリア１において行なわれる。ＣＰＵ１０は、電源制御部２０から通知される、電池残量検出機能によって検出された電源部２２の電圧値を示すデータに応じて、ＬＣＤ制御部１４に対して電池残量を表わす表

示データをＶＲＡＭ１６に格納すると共に、表示パネル１８ａにおいて表示させる。また、ＣＰＵ１０は、ＰＨＳ機能部２８から通知される基地局との間の電界強度を示すデータに応じて、ＬＣＤ制御部１４に対して電界強度を表わす表示データをＶＲＡＭ１６に格納させると共に、表示パネル１８ａにおいて表示させる。

【００２５】ＬＣＤ制御部１４は、ＣＰＵ１０からの通知に応じて、表示パネル１８ａの各エリア１，２を表示駆動するために各ドライバ１８ｂ～１８ｅを制御する。エリア１については常時（あるいはＰＨＳ機能部２８を待ち受け状態にしている時）、表示する必要があるため、ＬＣＤ制御部１４は、ＶＲＡＭ１６に格納された表示データ（電池残量を示す表示データ、電界強度を表わす表示データ）に応じて、エリア１用Ｙドライバ１８ｂ、エリア１用Ｘドライバ１８ｃを駆動させる。

【００２６】また、情報機器における一般の機能を実行する場合、ＬＣＤ制御部１４は、エリア２用Ｙドライバ１８ｄ、エリア２用Ｘドライバ１８ｅを駆動させて、エリア２において所定の表示を行なわせる。

【００２７】電源制御部２０は、ＬＣＤ制御部１４によって駆動制御される各ドライバに対して電力を供給する。一方、情報機器における一般の機能を使用しない場合には、例えば図３に示すようにして機器本体に設けられたＬＣＤカバー３２が、表示パネル１８ａの表示画面上を覆うようにして閉じられる。ＬＣＤカバー３２は、情報機器本体の上面端部を支点として、機器本体の上面に設けられた表示パネル１８ａと平行に対面する位置（閉状態）から、表示パネル１８ａの面と所定の角度をもった位置（開状態）まで回動自在となるように取り付けられている。

【００２８】ＬＣＤカバー３２は、表示パネル１８ａと平行に対向する位置にある時、すなわち表示パネル１８ａの表示画面上を覆うようにして閉じられ時、表示パネル１８ａの一部であるエリア２のみが覆われるようになっている。この状態において、ＬＣＤカバー３２は、機器本体の上面に設けられたスイッチ２６の状態を切り替える。スイッチ制御部２４は、スイッチ２６の状態が切り替えられたことを検出してＣＰＵ１０に通知する。

【００２９】ＣＰＵ１０は、スイッチ制御部２４からの通知に応じて、エリア２に対する表示駆動を停止、すなわちエリア２用Ｙドライバ１８ｄ、エリア２用Ｘドライバ１８ｅによる駆動を停止させる。またＣＰＵ１０は、電源制御部２０に対して、エリア２用Ｙドライバ１８ｄ、エリア２用Ｘドライバ１８ｅに対する電力供給の停止を指示する。

【００３０】つまり、エリア２の表示が不要であることを検出し、その場合には表示が必要なエリア１の表示のみを継続して行ない、エリア２については表示を停止する。従って、エリア２に対する表示を停止することで電力消費を低減することができる。

【００３１】また、ＬＣＤカバー３２の開閉と連動してエリア２に対する表示駆動の切り替えが行なわれるので、操作性が向上される。以上の説明では、ＰＨＳ機能部２８を通信の待ち受け状態にし、一般の情報機器の機能を用いない時など、エリア２の表示が必要ない場合に意図的に（ＬＣＤカバー３２を閉じるなどにより）表示切り替えをしているが、電源部２２の電池残量に応じて自動的に表示切り替えを行なうことができる。

【００３２】電源制御部２０は、電池残量検出機能により電源部２２における電池残量を、例えば所定の設定電圧値と比較することにより監視している。電源制御部２０は、電圧値が設定電圧値まで低下したことを検出するとＣＰＵ１０に通知する。

【００３３】なお、設定電圧値は、例えばエリア１，２の全面駆動はできないが、表示エリアの一部分であれば駆動できるような電池残量を検出できる値、あるいは若干の時間であれば機能を実行できる電池残量を残す値とする。

【００３４】ＣＰＵ１０は、ＲＯＭ１２に格納されたＳＷプログラムに従い、現在実行中の機能（プログラム）を正常に終了させると共に、電源制御部２０からの通知に応じてＬＣＤ制御部１４に対してエリア２の表示駆動を停止させる。また電源制御部２０は、エリア２用Ｙドライバ１８ｄ、エリア２用Ｘドライバ１８ｅに対する電力供給を停止する。

【００３５】これにより、エリア１において、ある程度の情報の表示を継続させることができる。なお、エリア１に対する表示駆動を停止させるのではなく、エリア１の表示を停止させ、エリア２に対する表示駆動を継続させて、情報機器の一般機能を実行させるようにしても良い。

【００３６】なお、前述した実施形態においては、情報機器に表示装置としてＬＣＤユニット１８が設けられているものとして説明しているが、他の表示用ユニットを用いた情報機器であっても同様な表示駆動方法を用いることができる。

【００３７】また、スイッチ２６は、ＬＣＤカバー２６が閉じられることによって状態が切り替えられるものとして説明したが、例えば手動により切り替えるなど、どのような手段によって状態が切り替えられても良い。また、機械的スイッチではなく、ＣＰＵ１０によって実行されるプログラムによって、ＬＣＤ制御部１４によるエリア２に対する表示駆動を切り替えるようにしても良い。

【００３８】また、前述した実施形態では、エリア１を常時表示すべき情報用（電界強度表示、電池残量表示）に用いているが、通常、エリア１とエリア２を合わせた表示パネル１８ａの全面を、情報機器の機能を実行する際の表示に用い、必要に応じてエリア１のみに特定の情報を表示するようにしても良い。

【００３９】また、前述した実施形態では、表示パネル１８ａを２つのエリア１，２に分割し、選択的にエリア２の表示を停止させるものとして説明しているが、エリアの数は２つに限定されるものではない。すなわち、３つ以上のエリアを設けて、それぞれのエリアに対応するＸドライバ、Ｙドライバを設け、各エリア毎に表示駆動制御、電力供給制御を行なうようにすることもできる。

【００４０】また、ＬＣＤカバー３２は、エリア２のみが覆われる形状としているが、表示パネル１８ａの全面を覆う形状とし、エリア１に対応する一部分のみが表示エリアを透過して視認できるようにしても良い。さらに、前述した実施形態におけるエリア１に表示される情報は、勿論、限定されるものではない。

【００４１】

【発明の効果】以上詳述したように本発明によれば、表示エリアを複数に分割し、各エリアを必要に応じて選択的に表示駆動できるので、表示すべき情報量に応じて表示制御することで低消費電力化を図ることが可能となるものである。

【図面の簡単な説明】

【図１】本発明の実施形態に係わる情報機器の構成を示すブロック図

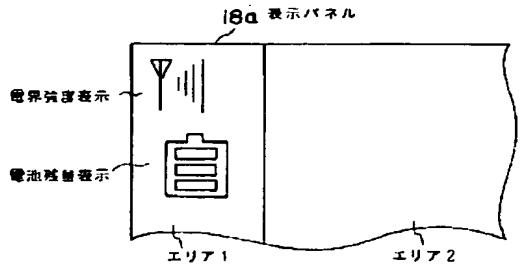
【図２】本実施形態における表示パネル１８ａのエリア１での表示例を示す図

【図３】本実施形態における情報機器の外観構成の一例を示す図

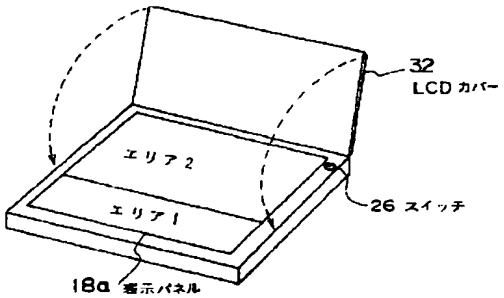
【符号の説明】

１０…ＣＰＵ（制御手段）
１２…ＲＯＭ
１４…ＬＣＤ制御部（表示制御手段）
１６…ＶＲＡＭ
１８…ＬＣＤユニット
１８ａ…表示パネル
１８ｂ…エリア１用Ｙドライバ
１８ｃ…エリア１用Ｘドライバ
１８ｄ…エリア２用Ｙドライバ
１８ｅ…エリア２用Ｘドライバ
２０…電源制御部（電源制御手段）
２２…電源部
２４…スイッチ制御部
２６…スイッチ（切り替え指示手段）
２８…ＰＨＳ機能部

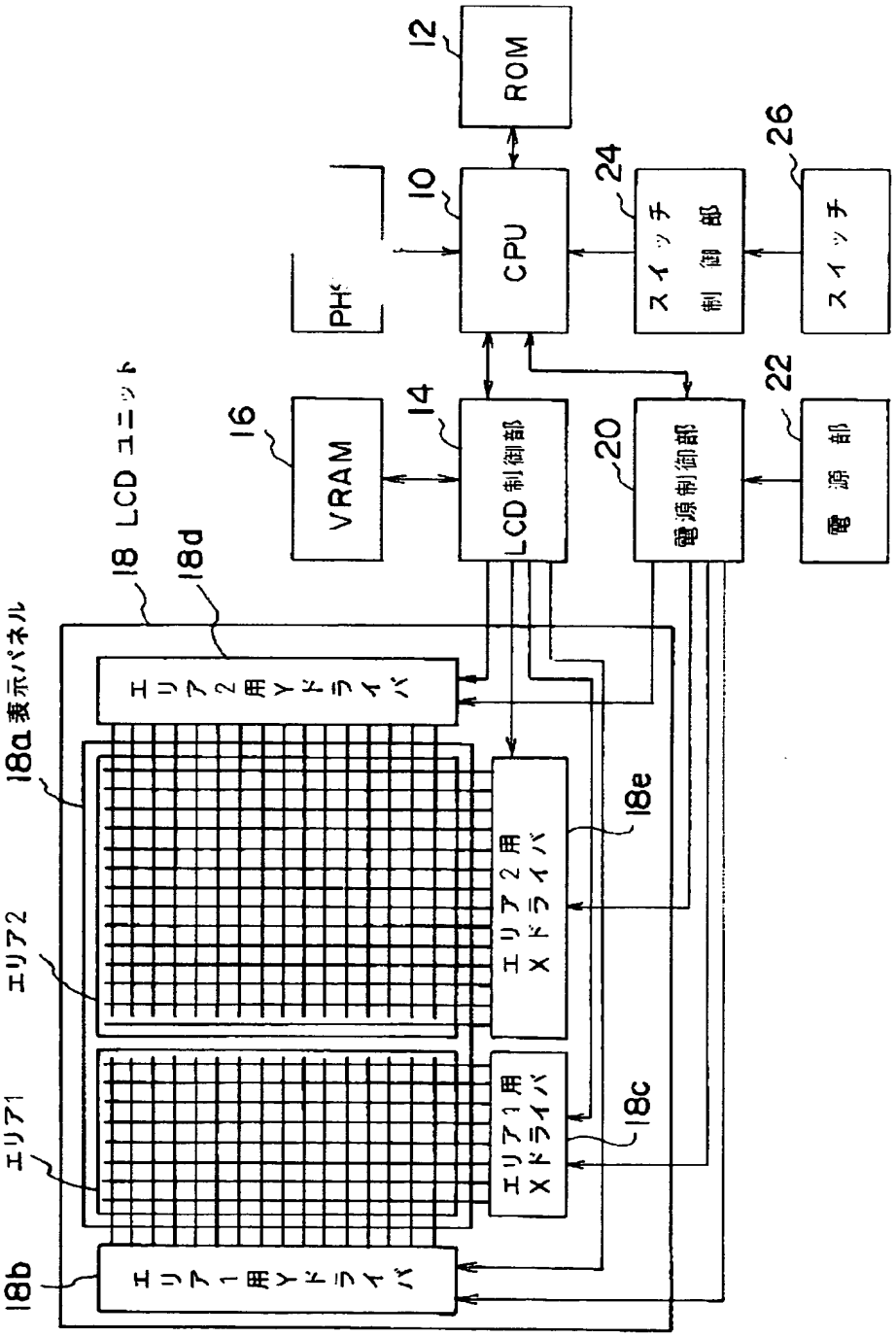
【図２】



【図３】



【図1】



フロントページの続き

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United States Patent [19]

Nomura et al.

[11] Patent Number: 5,881,299

[45] Date of Patent: Mar. 9, 1999

[54] **SELECTIVELY REMOVING POWER FROM MULTIPLE DISPLAY AREAS OF A DISPLAY UNIT**

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[73] Assignee: **Kabushiki Kaisha Toshiba**, Kawasaki, Japan

[21] Appl. No.: **721,020**

[22] Filed: **Sep. 26, 1996**

[30] **Foreign Application Priority Data**

Nov. 22, 1995 [JP] Japan 7-304202

[51] **Int. Cl.**° **G06F 1/32**

[52] **U.S. Cl.** **395/750.06**; 395/750.03; 345/103; 345/212

[58] **Field of Search** 345/103, 212, 345/1, 115, 116, 213; 395/750.01, 750.03, 750.04, 750.06

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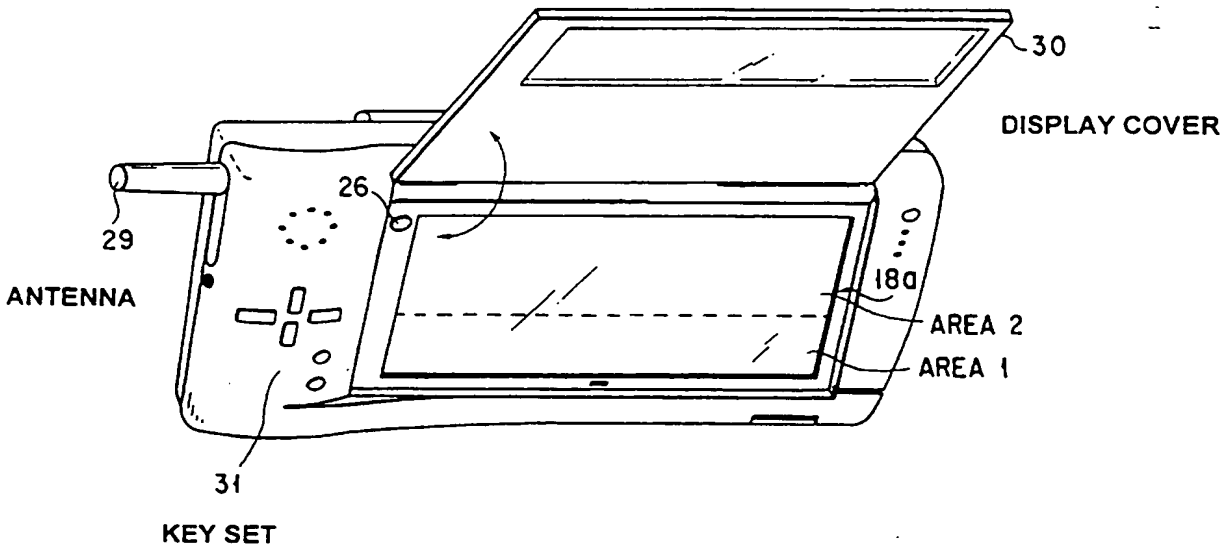
Primary Examiner—Meng-Ai T. An
Assistant Examiner—Sumati Lefkowitz
Attorney, Agent, or Firm—Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P.

[57] **ABSTRACT**

On one display panel, first and second display areas are provided. To display information on each area, an X-driver, a Y-driver, and an LCD controller are provided in each of the display areas. If a display cover is overlaid on the display panel, a predetermined switch is turned on. A CPU sends an instruction to a power supply controller in accordance with the ON-state of the switch. The power supply controller stops power supply to the X- and Y-drivers, and the LCD controller used in said first display area to save power by supplying power to drivers and controllers of a display area that is not covered.

15 Claims, 9 Drawing Sheets



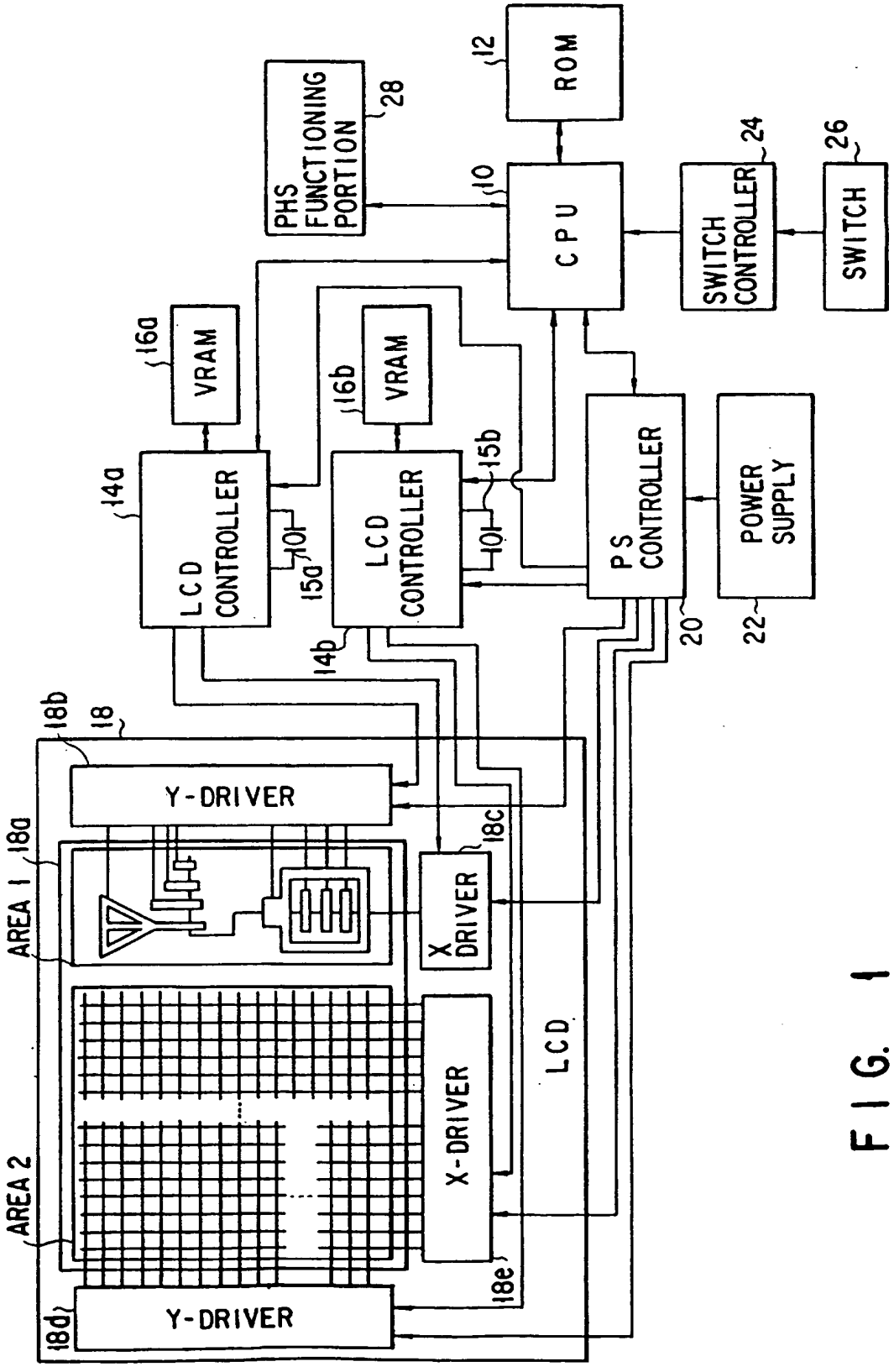


FIG. 1

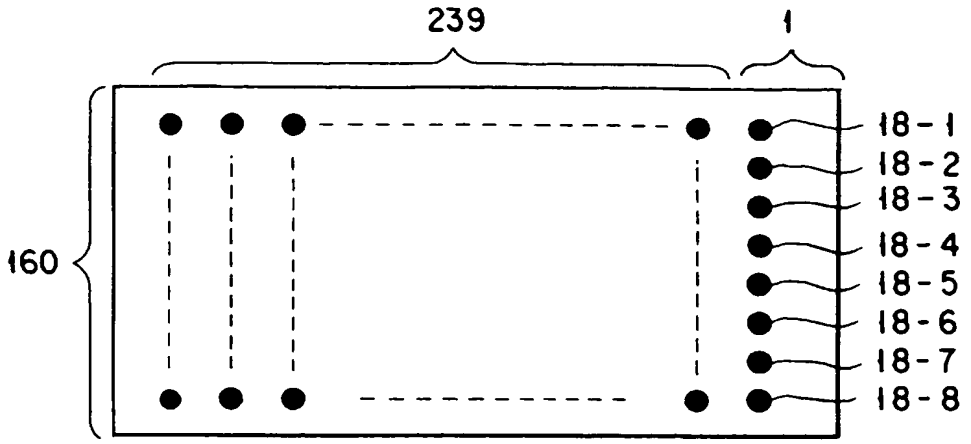


FIG. 2A

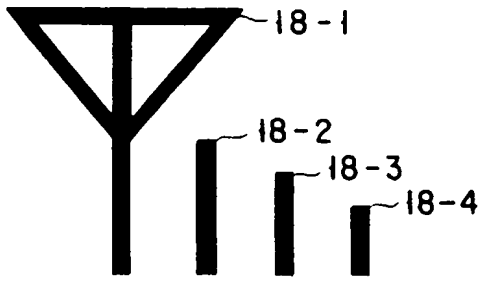


FIG. 2B

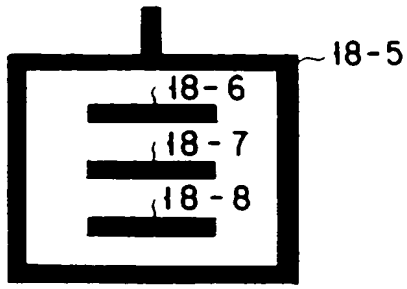


FIG. 2C

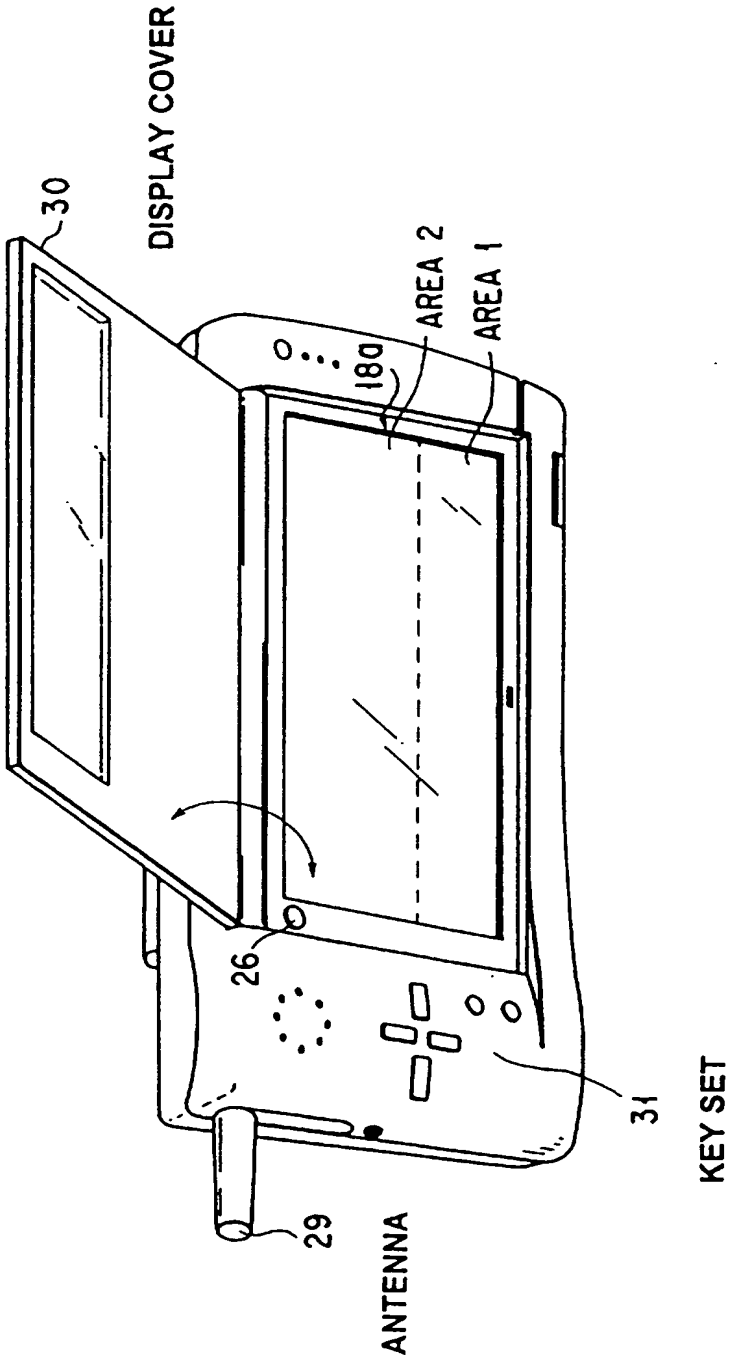


FIG. 3

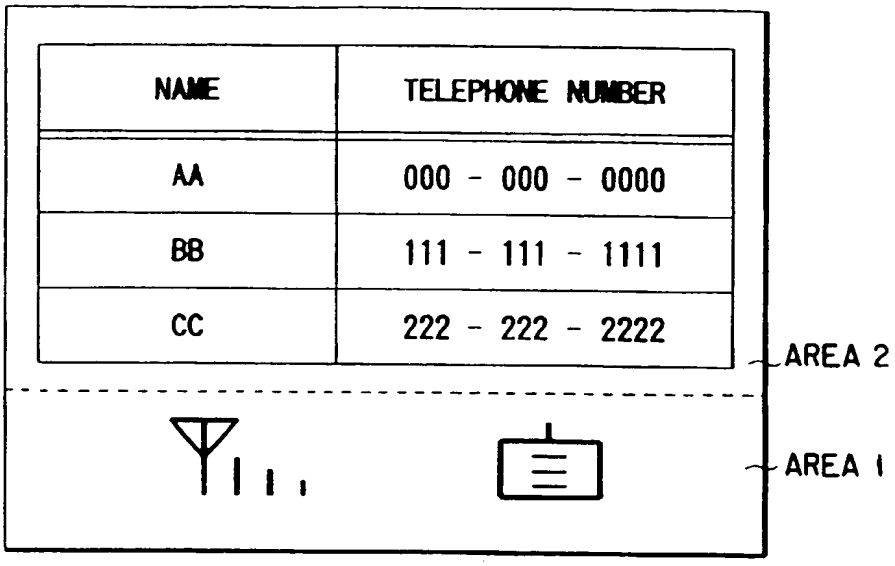


FIG. 4

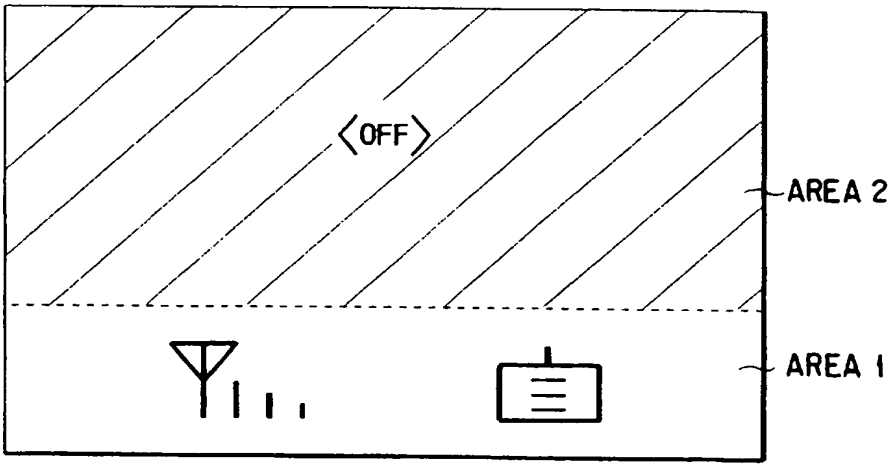


FIG. 5

FIG. 6A

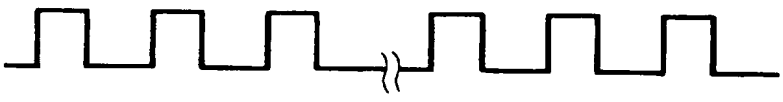
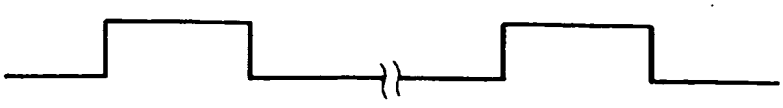


FIG. 6B



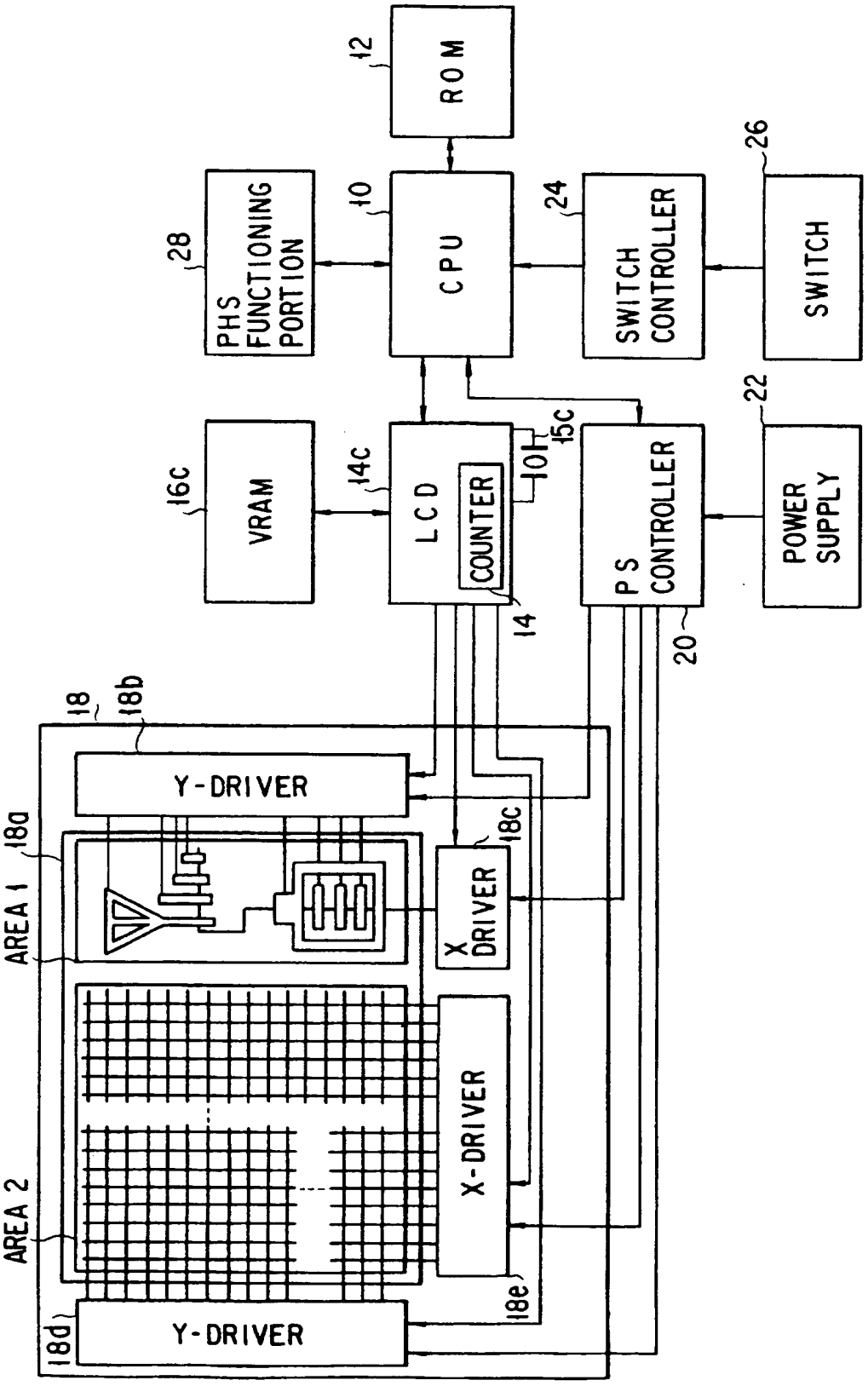


FIG. 7

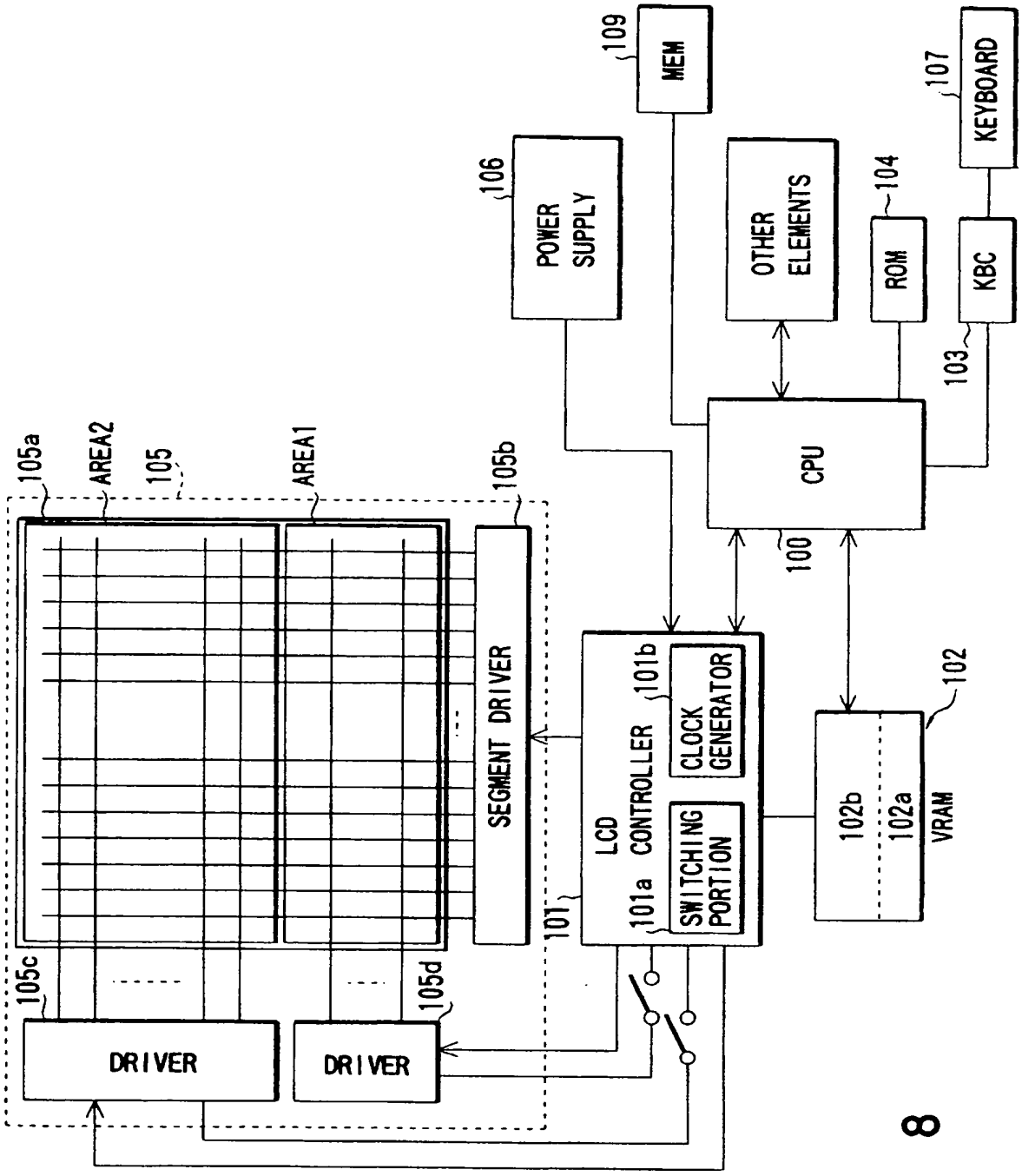


FIG. 8

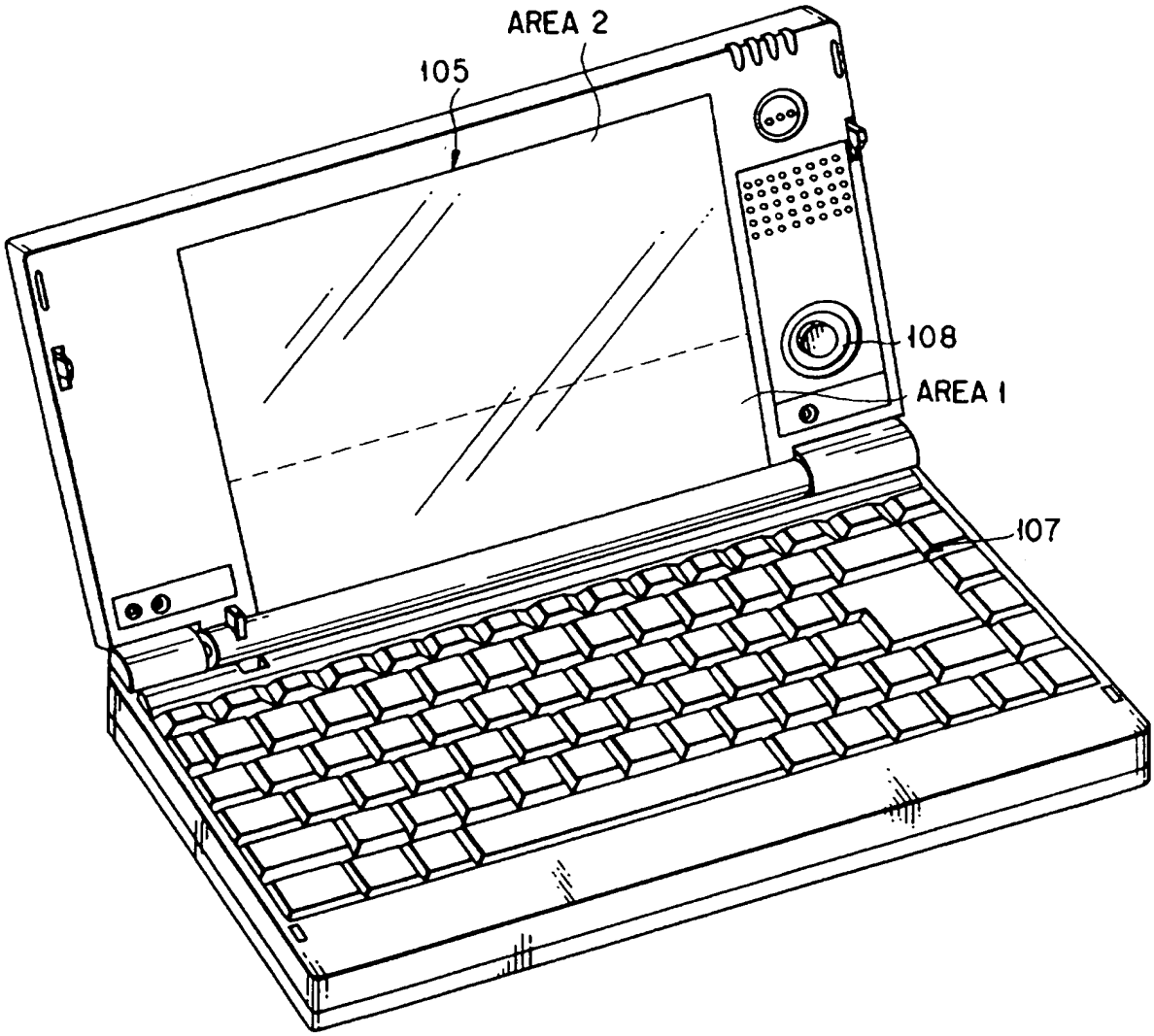


FIG. 9

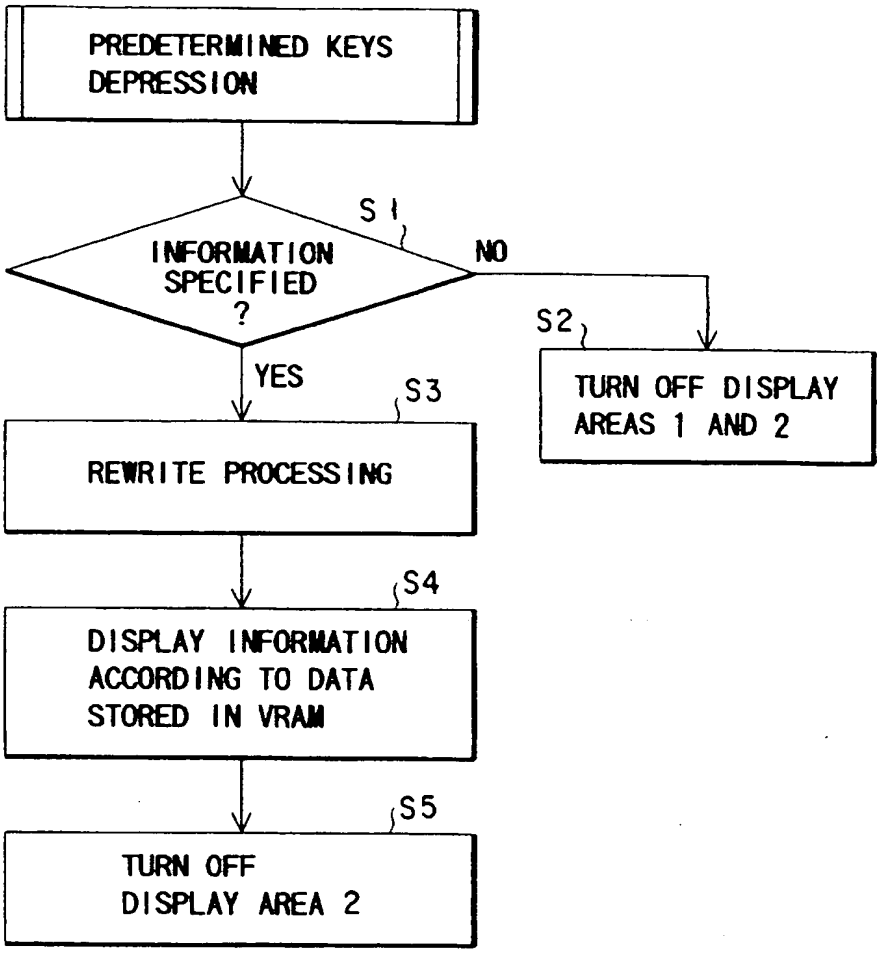


FIG. 10

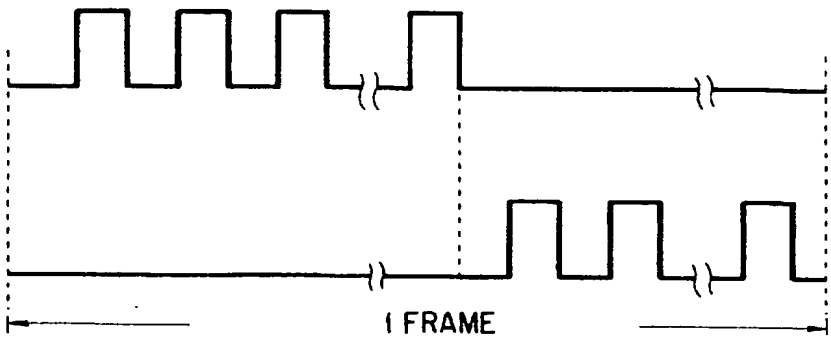


FIG. 11A

FIG. 11B

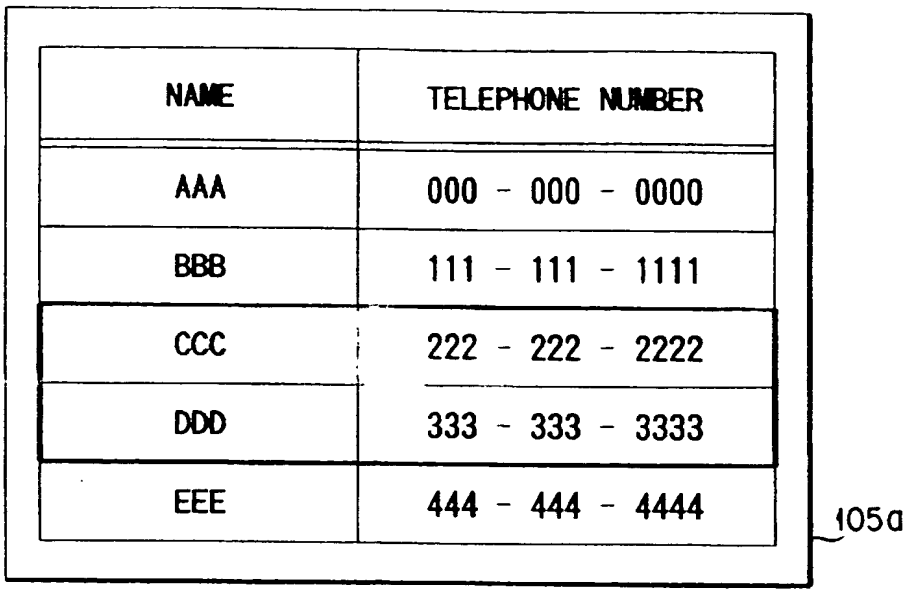


FIG. 12

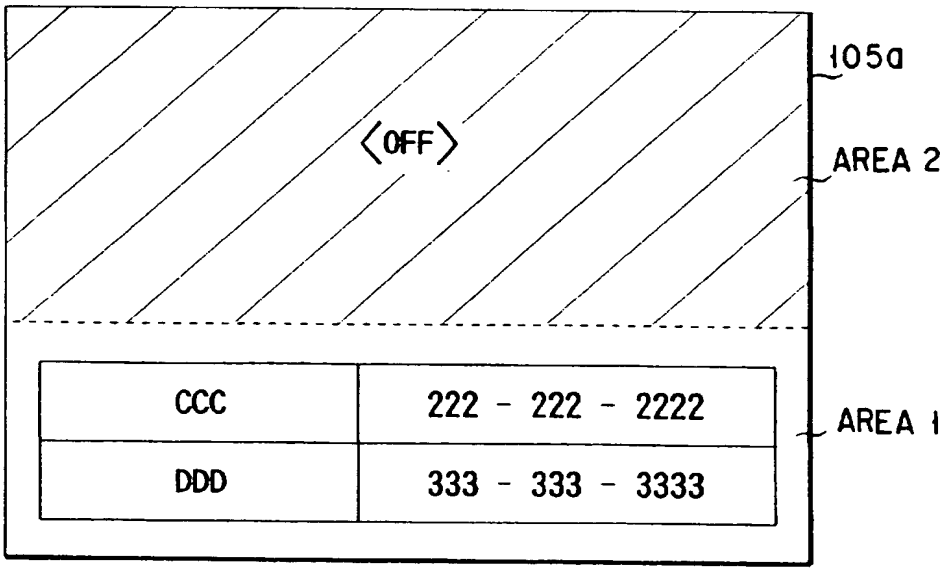


FIG. 13

SELECTIVELY REMOVING POWER FROM MULTIPLE DISPLAY AREAS OF A DISPLAY UNIT

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an information device having a display unit such as a liquid crystal display (LCD), etc., and particularly to an information device in which the display unit has a plurality of display areas and power consumption can be controlled by controlling the plurality of display areas.

2. Description of the Related Art

Generally, in a portable information device, the device having an LCD (liquid crystal display) is frequently used. Normally, in an information displaying method on the display unit, one system is provided with one LCD, and information is displayed on a screen of LCD when power is turned on. According to a conventional dot-matrix type LCD, one LCD unit has a pair of drivers for driving an electrode for a display in each of X- and Y-axis directions. At a power-on time, electric power is supplied to the driver for each of the axial directions, and the entire LCD screen is driven.

It is required that the handy type information device be used for a long period time by a battery driving. For this reason, displaying information by use of the display device is preferably restricted to the necessary minimum in order to reduce power consumption.

However, there is a case in which certain information must be always represented, depending on a function formed in the handy type information device. In this case, the entire display screen must be always driven to display information on the LCD display screen. For example, it is assumed that there is provided a function for notifying a residual amount of the battery in the information device. In this case, information for showing the residual amount of the battery must be always represented. Due to this, the LCD screen is always driven to display such information on the LCD display screen.

In this case, there can be considered the use of an LED (light-emitting diode). In general, however, electric power, which is necessary for driving the LED, is much larger than electric power, which is necessary for driving the LCD.

As mentioned above, in the conventional information device, the entire LCD display must be always driven to always display certain information on the screen. As a result, a large amount of power is consumed, and time for driving the information device using the battery is reduced.

SUMMARY OF THE INVENTION

An object of the present invention is to provide an information device in which a plurality of display areas is formed in a display unit and these display areas are controlled in accordance with an amount of information to be displayed so as to reduce power consumption.

According to a first aspect of the present invention, there is provided an information device comprising: a display panel having a first display area and a second display area; first driver means for displaying information on said first display area; second driver means for displaying information on said second display area; a first controller for controlling said first driver means; a second controller for controlling said second driver means; a cover attached to said information device to be rotatable; a switch for detecting that said cover is overlaid on said display panel; and power supply means for supplying power to said first and second driver means and said first and second controllers, and said power supply means for stopping power supply to said first driver means and said first controller in accordance with the detection by said switch.

According to a second aspect of the present invention, there is provided an information device comprising: a display panel having a first display area and a second display area; first driver means for displaying information on said first display area; second driver means for displaying information on said second display area; a controller for controlling said first and second driver means; a cover attached to said information device to be rotatable; a switch for detecting that said cover is overlaid on said display panel; and power supply means for supplying power to said first and second driver means and said first and second controllers, and said power supply means for stopping power supply to said first driver means in accordance with the detection by said switch.

According to a third aspect of the present invention, there is provided an information device comprising: a display panel having a first display area and a second display area; a common driver for driving lines in a vertical direction of said first and second display areas; a first driver for driving lines in a horizontal direction of said first display area; a second driver for driving lines in a horizontal direction of said second display area; a power supply for generating power to be output; a keyboard having a plurality of keys; detecting means for detecting a depression of a predetermined keys of said keyboard by an operator; a memory for storing display data; and a controller for supplying power to said common driver, and said first and second drivers, respectively, and for controlling said common driver, said first and second drivers in accordance with display data stored in said memory so as to be displayed, and for stopping power supply to said first driver in accordance with the detection of said detecting means.

According to the above information device, the display area on one display panel can be divided into a plurality of areas so as to selectively drive the respective areas as required. As a result, the display control can be carried out in accordance with an amount of information to be displayed, so that power consumption can be reduced.

Additional objects and advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the instrumentalities and combinations particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate presently preferred embodiments of the invention and, together with the general description given above and the detailed description of the preferred embodiments given below, serve to explain the principles of the invention.

FIG. 1 is a block diagram showing the structure of the information device according to a first embodiment of the present invention;

FIGS. 2A to 2C are views each explaining a display panel of FIG. 1;

FIG. 3 is an outline view of the information device of FIG. 1;

FIG. 4 is a view showing one example of information displayed on the display panel of FIG. 1;

FIG. 5 is a view showing only a predetermined area of the display panel of FIG. 1;

FIGS. 6A and 6B are timing charts each showing a clock signal applied to the information device of FIG. 1;

FIG. 7 is a view showing the structure of the modification of the information device of FIG. 1;

FIG. 8 is a block diagram showing the structure of the information device according to a second embodiment of the present invention;

FIG. 9 is an outline view of the information device of FIG. 8;

FIG. 10 is a flow chart showing a display control operation of the information device of FIG. 8;

FIGS. 11A and 11B are timing charts each showing a clock signal applied to the information device of FIG. 8;

FIG. 12 is a view showing one example of information displayed on the display panel of FIG. 8; and

FIG. 13 is a view showing only a predetermined area of the display panel of FIG. 8.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Embodiments of the present invention will now be described with reference to the accompanying drawings.

A first embodiment, first, will be described.

FIG. 1 is a block diagram showing the structure of an information device of this embodiment. As shown in FIG. 1, the information device of this embodiment comprises a CPU **10**, a ROM **12**, LCD controllers **14***a*, **14***b*, VRAMs **16***a*, **16***b*, an LCD unit **18**, a power supply controller **20**, a power supply **22**, a switch controller **24**, a switch **26**, and a PHS (personal handy phone system) functioning portion **28**.

The CPU **10** executes a program in accordance with a program stored in the ROM **12** to control the entire information device.

The ROM **12** stores various kinds of data in addition to the program for defining the operation of the CPU **10**. The program stored in the ROM **12** includes a SW program for controlling the LCD controllers **14** in accordance with a state of the switch **26** notified from the switch controller **24** and a power supply controller **20**, and a program for controlling a data communication using the PHS functioning portion **28**.

The LCD controllers **14***a* and **14***b* carry out a display control through the LCD **18** under the control of the CPU **10**. The LCD controllers **14***a* and **14***b* drive drivers (to be described later) of the LCD unit **18** in accordance with display data stored in the VRAMs **16** so as to display information. The LCD controllers **14***a* and **14***b* turn on/off the drivers in accordance with notification from the CPU **10** so as to display only information of a specific area on the display screen. In the first embodiment, as shown in FIG. 1, two LCD controllers **14***a* and **14***b* are provided to carry out the display control of the two areas formed on the LCD unit **18***a* individually.

Also, crystal oscillators **15***a* and **15***b* are connected to the LCD controllers **14***a* and **14***b*, respectively. The crystal oscillators **15***a* and **15***b* generate clock signals having a different frequency to be supplied to the LCD controllers **14***a* and **14***b*, respectively. For example, the crystal oscillator **15***a* supplies the clock signal shown in FIG. 6B to the LCD controller **14***a*, and the crystal oscillator **15***b* supplies the clock signal shown in FIG. 6A to the LCD controller **14***b*.

The VRAMs **16***a* and **16***b* are connected to the LCD controllers **14***a* and **14***b*, respectively. The VRAMs **16***a* and **16***b* store display data to be displayed to the LCD unit **18**. The VRAMs **16***a* and **16***b* are controlled by the LCD controllers **14***a* and **14***b*, respectively.

The LCD unit **18** is controlled to receive power supply by the power supply controller so as to display information under control of the LCD controllers **14***a* and **14***b*. The LCD **18** comprises a display panel **18***a*, a Y-driver **18***b* for an area **1**, an X-driver **18***c* for an area **1**, a Y-driver **18***d* for an area **2**, and an X-driver **18***e* for an area **2**. The display panel **18***a* is divided into areas **1** and **2**, which are independently driven by the corresponding drivers. Specifically, the area **1** is driven by the drivers **18***b* and **18***c*, and the second area **2** is driven by the drivers **18***d* and **18***e*. The Y-driver **18***b* and X-driver **18***c* are driven by the LCD controller **14***a*, and the Y-driver **18***d* and X-driver **18***e* are driven by the LCD controller **14***b*.

As mentioned above, two display areas **1** and **2** are formed on the display panel **18***a*, which is the single panel. In the first embodiment, an annunciator for showing intensity of electric field and an annunciator for showing a residual amount of the battery are displayed on the area **1**.

The power supply controller **20** supplies electric power from the power supply **22** to the respective parts constituting the information device including the LCD unit **18**. The power supply controller **20** has a function of detecting the amount of power (residual amount of battery) stored in the power supply **20**. If a voltage is decreased to a predetermined value, the power supply controller **20** notifies the decrease in voltage to the CPU **10**, and controls the power supply to the predetermined drivers of the LCD unit **18**.

The power supply **22** is a battery for storing electric power to be supplied to the respective parts constituting the information device including the LCD unit **18**.

The switch controller **24** detects the on/off state of the switch **26**. If the switch **26** is changed, that is, it is unnecessary to display information on the area **2** of the display panel **18***a*, the switch controller **24** notifies the state to the CPU **10**.

The switch **26** is used to detect the state in which the information display on the area **2** is not needed. In this embodiment, the switch **26** is changed when an LCD cover **32** for covering the area **2** is closed. The on/off state of the switch **26** is detected by the switch controller **24**, and the state is notified to the CPU **10**.

The PHS functioning portion **28** is used to carry out a radio communication based on the standard of PHS. The PHS functioning portion **28** notifies data, which is received and transmitted through the radio communication, and intensity of electric field between the information device and a base station to the CPU **10**.

The following will explain information display on the areas **1** and **2** of the display panel **18***a* with reference to FIGS. 2A to 2C.

As shown in FIG. 2A, the area **2** of the display panel **18***a* is formed of 160 pixels in a vertical direction and 239 pixels in a horizontal direction. The Y-driver **18***d* controls 160 lines in the horizontal direction, and the X-driver **18***e* controls 239 lines in the vertical direction. The area **1** of the display panel **18***a* is formed of one pixel in a vertical direction and 8 pixels in a horizontal direction. In order to perform display controlling of one pixel, he Y-driver **18***b* controls 8 lines in a horizontal line, and the X-driver **18***c* controls one line in the vertical direction. In this case, the respective pixels of the area **2** have the same size. Then, a predetermined shape is allocated to the respective pixels of the area **1**.

Predetermined shapes as shown in FIGS. 2B and 2C are allocated to the respective pixels **18-1** to **18-8** of the area **2**. The shapes of the pixels **18-1** to **18-4** shown in FIG. 2B are provided to display the annunciator showing density of electric field. The shapes of the pixels **18-5** to **18-8** shown in FIG. 2C are provided to display the annunciator showing the residual amount of the battery.

An example of the outline of the information device to which the above-mentioned structure is applied will be described as follows.

FIG. **3** shows the outline of the information device to which the above-mentioned structure is applied. In the display device, there is provided an antenna **29** for realizing the PHS function. The antenna **29** is provided to be containable in the main body of the device. A display cover **30** is attached to the device to be rotatable by a hinge mechanism (not shown). The display cover **30** can rotate to overlay on the display panel **18***a*. At this time, the area **2** is covered with the display cover **30**, and only the area **1** can be seen from the outer section. Or, the switch **26** is turned on when the cover **30** is overlaid on the display panel **18***a*. In the information device, a key set **31** for inputting an operator's instruction. However, the information device may be structured such that a manual input can be carried out with a predetermined pen.

An operation of the information device of this embodiment will be explained as follows.

In the information device of this embodiment, there are provided the function of displaying the intensity of electric field between the information device and the base station, and a function of displaying the residual amount of the battery stored in the power supply **22**.

As shown in FIG. **4**, the intensity of electric field and the residual amount of the battery are displayed on the area **1** formed on the panel **18***a* of the LCD unit **18**. The CPU **10** outputs display data showing the residual of the battery through the LCD controller **14***a* in accordance with data notified from the power supply controller **20** to show the voltage value of the power supply **22** detected by the battery residual detecting function. The display data is stored in the VRAM **16***a*. Then, the display data is displayed on the display panel **18***a*. The CPU **10** outputs displayed data showing the density of the electric field through the LCD controller **14***a* in accordance with data notified from the PHS functioning portion **28** to show the density of electric field between the information device and the base station. The display data is stored in the VRAM **16***a*. Then, the display data is displayed on the display panel **18***a*.

The LCD controllers **14***a* and **14***b* control the drivers **18***b*, **18***c* and the drivers **18***d*, **18***e* so that the respective areas **1** and **2** of the display panel **18***a* are driven in accordance with the notification from the CPU **10**. Since it is needed that the area **1** be always displayed (or standby state for PHS functioning portion **28**), the LCD controller **14***a* drives the Y-driver **18***b* and the X-driver **18***c* in accordance with display data stored in the VRAM **16***a* (display data showing the residual of the battery, display data showing density of electric field).

For executing the general function of the information device, the LCD controller **14***b* drives the Y-driver **18***d* and the X-driver **18***e* to display information on the area **2**. For example, as shown in FIG. **4**, the LCD controller **14***b* dives the Y-driver **18***d* and the X-driver **18***e* to display a telephone book on the area **2**.

The power supply controller **20** supplies power to the respective drivers, which are controlled by the LCD controllers **14***a* and **14***b*, and the LCD controllers **14***a* and **14***b*.

In a case where the general function of the information device is not used, the following operation can be executed.

Specifically, the LCD cover **30**, which is attached to the main body of the device is closed to cover the display screen of the display panel **18***a*. The LCD cover **32** is attached to the main body of the device to be freely rotated from a close state to an open state. The close state corresponds to a position facing in parallel to the display panel **18***a* formed on an upper surface of the main body of the device. In this case, the end portion of the upper surface of the main body is set as a fulcrum. The open state corresponds to a position having a predetermined angle with a surface of the display panel **18***a*.

If the LCD cover **30** is placed at the position facing in parallel to the display panel **18**, that is, the cover **30** is closed to cover the display screen of the display panel **18**, only the area **2**, which is a part of the panel **18***a*, is covered. In this state, the LCD cover **30** changes the state of the switch **26** provided on the upper surface of the main body of the device. The switch controller **24** detects that the switch **26** is changed and notifies the state of the switch **26** to the CPU **10**.

The CPU **10** stops displaying information on the area **2** in accordance with the notification from the switch controller **24**. In other words, the drive of each of the Y- and X-drivers **18***d* and **18***e* is stopped. Also, the CPU **10** designates the power supply controller **20** to stop the power supply to the Y- and X-drivers **18***d* and **18***e*, and the LCD controller **14***b*. An example of the display on the display panel **18***a* in this case is shown in FIG. **5**.

Specifically, when the unnecessariness of displaying information on the area **2** is detected, only the area **1**, which is necessary to be displayed, is continued to be displayed, the display on the area **2** is stopped. As a result, power consumption can be reduced. A high-voltage, for example, 20V or 40V, serving as a power supply for liquid crystal driving, is supplied to the respective drivers. Then, for example, 3.3V or 5.0V, serving as a logic power supply, is supplied to the LCD controllers. In the first embodiment, the power supply to the LCD controller **14***b*, Y- and X-drivers **18***d*, and **18***e* is stopped, so that power consumption can be largely reduced.

Moreover, the display drive of the area **2** is changed together with the open/close operation of the LCD cover **30**, so that operability can be improved.

In the above explanation, the display change is intentionally carried out by, for example, closing the LCD cover **30** when there is no need of displaying information on the area **2**, e.g., at the time when the PHS functioning portion **28** is set to a standby state for a radio communication and the function of the general information device is not used. It is, however, possible to automatically carry out the display change in accordance with the residual amount of the battery of the power supply **22**.

The power supply controller **20** detects the residual amount of the battery of the power supply **22** by comparing the residual amount of the battery with a predetermined voltage value with use of the battery residual detecting function. When the power supply controller **20** detects that the voltage value is decreased to the predetermined voltage value, the result is notified to the CPU **10**.

In this case, the predetermined voltage value means the residual amount of the battery with which can drive not the entire surfaces of the areas **1** and **2** but a part of the display area. Or, the predetermined voltage value means the residual amount of the battery with which can execute the function for a short period of time.

The CPU **10** normally ends the current executing function (program) in accordance with the SW program stored in the ROM **12**. Also, the CPU **10** stops the display drive of the area **2** through the LCD controller **14***b* in accordance with the notification from the power supply controller **20**. The power supply controller **20** stops the power supply to each of the Y- and X-drivers **18***d* and 1[illegible] the LCD controller **14***b*.

Thus, information display on the a[illegible] can be continued to some extent.

In [illegible] above-mentioned embodiment, the LCD unit **18** was [illegible]d as a display device in the information device. How[illegible] same display driving method can be used even in the [illegible]tion device using the other display unit.

M[illegible] above embodiment explained that the state of the [illegible] was changed by closing the LCD cover **30**. However, the [illegible]e of the switch **26** may be changed by any means, e.g., a manual method. Also, the display drive of the area **2** may be changed through the LCD controllers **14** by the programs executed by not the mechanical switch but the CPU **10**.

In the above-mentioned embodiment, the area **1** was used as an area for information to be always displayed (intensity of electric field, residual amount of the battery). However, the entire surface of the display panel **18***a* including the areas **1** and **2** may be used as a display for executing the function of the information device, and specific information may be displayed on only the area **1** as required.

Moreover, the above embodiment explained that the display panel **18***a* was divided into two areas **1** and **2**, so that the display of the area **2** was selectively stopped. However, the number of the areas is not limited to two. Three or more areas may be formed, and the X- and Y-drivers corresponding to the respective areas may be formed. Then, the display control and the power supply control of each area can be carried out.

In the above-mentioned embodiment, the LCD cover **30** was shaped to cover only the area **2**. However, the LCD cover **30** may be shaped to cover the entire surface of the panel **18***a* so that only a part corresponding to the area **1** is transmitted through the display area so as to be visually conformed.

Moreover, in the above-mentioned embodiment, information displayed on the area **1** is not, of course, limited.

The following will explain a modification of the first embodiment with reference to FIG. **7**.

The information device shown in FIG. **7** is structured to have one LCD controller is used in place of two LCD controllers of FIG. **1**. In FIG. **7**, the same reference numerals as the case of the first embodiment are added to the portions common to the first embodiment.

A crystal oscillator **15***c* and a VRAM **16***c* are connected to an LCD controller **14***c*. The LCD controller **14***c* has a counter **141** built-in. The LCD controller **14***c* counts the clock signal having a predetermined frequency, which is supplied from the crystal oscillator **15***c*, thereby generating the clock signals shown in FIGS. **6**A and **6**B. The drivers **18***b* and **18***c*, and the drivers **18***d* and **18***e* are individually controlled in accordance with the generated different clock signals. The clock signals shown in FIGS. **6**A and **6**B indicate timing to control the LCD drivers **18***b*, **18***c*, **18***d* and **18***e* for convenience of explanation. The waveforms of the clock signals shown in FIGS. **6**A and **6**B differ from actual waveforms.

In this modification, when the cover **30** is closed, the power supply to the drivers **18***b* and **18***c* are stopped from the power supply controller **24**. As a result, the power supply for the liquid crystal drive can be saved.

As mentioned above, according to the present invention, the display area is divided into the plurality of areas on the same display panel, so as to selectively display each area as required. As a result, the display can be controlled in accordance with the amount of information to be displayed, thereby making it possible to reduce the power consumption.

Next, the following will explain a second embodiment of the present invention with reference to the drawings.

The structure of the LCD control of the information device of the second embodiment is shown in FIG. **8**, and the outline is shown in FIG. **9**. The information device shown in FIGS. **8** and **9** is a small-sized portable computer having a size and a weight enough to be mounted on the palm of the operator's hand.

A CPU **100** is connected to the various kinds of structural elements of the information device to control the entire information device. The CPU **100** is connected to the an LCD controller **101**, a VRAM **102**, a keyboard controller (KBC) **103**, a ROM **104**, and the other structural elements such as a system memory.

The LCD controller **101** is connected to the VRAM **102**, segment drivers **105***b*, **105***c*, and **105***d*. The LCD controller **101** controls various kinds of processing for display data and the drive of each of the drivers **105***b* to **105***d* in order to display information of on a display panel **105***a* of an LCD unit **105**. The LCD controller **102** has a switch portion **101***a*, and a clock generator **101***b* built-in. The clock generator **101***b* generates a clock signal having a predetermined frequency to be supplied to the switch **101***a*. The switch **101***a* changes the received clock signal by a predetermined timing so as to generate a clock signal shown in FIGS. **11**A and **11**B.

The LCD controller **101** controls the driver **105***c* by the timing of the clock signal shown in FIG. **11**A. Also, the LCD controller **101** controls the driver **105***d* by the timing of the clock signal shown in FIG. **11**B. It is noted that the LCD controller **101** controls the driver **105***b* by the timing of the clock signal, which is not yet changed by the switch **101***a*, that is, the timing of the clock signal generated by the clock generator **101***b*.

The LCD controller **101** is connected to a power supply (battery) **106**. The LCD controller **101** inputs power for driving from the power supply **106**. The LCD controller also inputs power for drivers **105***b* to **105***d*, the so-called driving power for liquid crystal so as to be supplied to the drivers **105***b* to **105***d*. The LCD controller **101** turns on/off the power supply for liquid crystal under the control of the CPU **100**. For example, the power supply to the drivers **105***c* and **105***d* is individually controlled in accordance with the control of the LCD controller **101**. As a result, the LCD controller **101** drives both the drivers **105***c* and **105***d* so as to display information on the two areas **1** and **2** as shown in FIGS. **8** and **9**. Or, the LCD controller **101** drives only the driver **105***c* or **105***d* so as to display information on only the area **1** or **2**. In the second embodiment, the information device is structured such that only the area **1** can be separately displayed. Then, for displaying information on only the area **1**, the power supply to the driver **105***c* is stopped.

The VRAM **102** stores display data of information to be displayed on the display panel **105***a*. The VRAM **102** has a storage area **102***a* for an area **1** and a storage area **102***b* for an area **2**.

The KBC **103** is connected to a keyboard **107**. The KBC **103** inputs an operator's instruction due to the depression of

the key of the keyboard **107**, and notifies the instruction to the CPU **100**. If the KBC **103** detects that an Fn key and any one of function key are simultaneously depressed, the KBC **103** recognizes the detected result as a depression of a hot-key to be notified to the CPU **100**. The CPU **100** controls the LCD controller **101** to display only the area **1** in accordance with the depression of the hot-key.

It is noted that the information device of this embodiment has a pointing device **101** (FIG. **9**) in addition to the keyboard as an device for inputting the operator's instruction.

The ROM **104** stores a program, which is necessary to the operation of the CPU **100**. A memory (MEM) **109** stores various kinds of programs, which are necessary for the operation of the information device, and data. In the second embodiment, in the case of displaying only the area **1**, the memory **109** stores data whether or not data instructing from the operator is designated in advance. If such data is designated, the memory **109** stores designating data showing which information is displayed.

Next, the following will explain an operation of the display control of the information device of the second embodiment with reference to FIGS. **10**, **12**, and **13**.

When power is supplied to the information device in the normal use, the LCD controller **101** supplies power to the drivers b to d so as to display, e.g., a telephone book, on the areas **1** and **2** of the display panel **105***a*. In this case, if the Fn key and a predetermined function key is depressed, the KBC **103** notifies the depression of the hot-key to the CPU **100**. The CPU **100** reads designation data of the memory **109** in accordance with the notification of the depression of the hot-key.

If designation data shows that no display information onto the area **1** is designated (step S1, NO), the CPU **100** designates the LCD **101** to stop the power supply to the drivers b to d. As a result, the areas **1** and **2**, that is, the display processing of the entire surface of the display panel **105** is stopped (step S2). In this case, the power supply of the entire information device is not turned off. In other words, only the power supply to the LCD unit **105** is stopped.

If the read designation data shows that names CCC and DDD, and telephone numbers of CCC and DDD are to be displayed on the area **1** as shown in FIG. **12** (step S1, YES), the CPU **100** executes a rewriting processing of display data stored in the VRAM **102** (step S3). In the rewriting processing, the CPU **100** writes data of the names CCC and DDD, and the telephone numbers of CCC and DDD, that is, display data, which corresponds to information enclosed by a thick line of FIG. **12**, to the storage area **102***a*.

Thereafter, the LCD controller **101** displays information on the display panel **105***a* in accordance with display data stored in the VRAM **102**, and stops the power supply to the drivers **105***c* (steps S4 and S5). Thereby, information as shown in FIG. **13** is displayed on the area **1**, and no information is displayed on the area **2**.

As mentioned above, according to the second embodiment, two display areas are formed on one display panel. Then, only necessary information is displayed on a predetermined area in accordance with the operation of the hot-key by the operator. As a result, power, which is necessary to display information on the other area, can be saved. Thus, the second embodiment can obtain the same advantage as the case of the first embodiment.

Additional advantages and modifications will readily occur to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details, and representative devices shown and described herein. Accordingly, various modifications may be made without departing from the spirit or scope of the general inventive concept as defined by the appended claims and their equivalents.

What is claimed is:

1. An information device comprising:

a display panel having a first display area and a second display area for separately displaying information different from each other;

a cover for covering at least part of said display panel, in which an operator is capable of viewing said first display area and not capable of viewing said second display area when said cover is overlaid on said display panel; and

means for controlling such that information is not displayed on said second display area by stopping power to said second display area and information is displayed on said first display area when said cover is overlaid on said display panel.

2. An information device according to claim **1**, further comprising a battery, said controlling means stopping power supplied from said battery to said second display area.

3. An information device according to claim **1**, further comprising means for carrying out a radio communication, said first display area for displaying information regarding said radio communication.

4. An information device according to claim **3**, wherein said first display area displays information indicative of an intensity of an electric field between said information device and a base station using said means for carrying out a radio communication.

5. An information device according to claim **2**, wherein said first display further displays information indicating an amount of charge remaining in said battery.

6. An information device according to claim **2**, further comprising means for stopping power supplied to said second display area in accordance with an amount of charge remaining in said battery.

7. An information device according to claim **1**, further comprising a switch for detecting that said cover is overlaid on said display panel, said controlling means stopping the displaying on said second display area in response to said switch.

8. An information device according to claim **1**, further comprising driver means, controlled by said controller means, for displaying information on said second display area, wherein power supplied to said driver means and said controller means is stopped when said cover is overlaid on said display panel.

9. An information device comprising:

a display panel having a first display area and a second display area for separately displaying information different from each other;

means for carrying out a radio communication, said first display area for displaying information indicative of an intensity of an electric field between said information device and a base station using said means for carrying out a radio communication;

a cover for covering at least part of said display panel, such that an operator is capable of viewing said first display area and not capable of viewing said second display area when said cover is overlaid on said display panel; and

means for controlling such that information is not displayed on said second display area by stopping power

to said second display area and the information indicative of the intensity of the electric field is displayed on said first display area when said cover is overlaid on said display panel.

10. An information device according to claim **9**, wherein the intensity of the electric field is represented on said first display area by an annunciator including a plurality of pixels each having a predetermined shape.

11. An information device according to claim **9**, wherein said first display area further displays information indicating an amount of charge remaining in a battery provided in said information device.

12. An information device comprising:

a display panel having a first display area and a second display area for separately displaying information different from each other; a cover for covering at least part of said display panel, in which an operator is capable of viewing said first display area and not capable of viewing said second display area when said cover is overlaid on said display panel;

means for specifying by an operator in advance, part of the information displayed on said first and second display areas; and

means, responsive to an instruction by an operator, for controlling such that information is not displayed on said second display area by stopping power to said second display area and causing said first display area to display the information specified by the operator.

13. An information device according to claim **12**, further comprising means for carrying out a radio communication, said first display area displaying information regarding said radio communication.

14. An information device according to claim **12**, wherein said first display area displays information indicative of an intensity of an electric field between said information device and a base station.

15. An information device according to claim **12**, wherein said first display area displays information indicating an amount of charge remaining in a battery provided in said information device.

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